

DEVELOPMENT DESIGN OF A MINI SATAY SKEWERING MACHINE

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SUPERVISOR'S DECLARATION

We hereby declare that we have checked this project and in our opinion this project is satisfactory in terms of scope and quality for the award of Diploma in Mechanical Engineering

Signature

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To all my beloved family

ACKNOWLEDGMENTS

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ABSTRACT

See the problem machine satay concept now, not have yet satay machine where using skewering concept can easy to carry. Now the product have the same concept just have bigger machine, cannot to carry and can make more the satay quantity. This skewering concept, easy to the customer rotate the satay and protected the hand from burn heat and kill time to burn satay process. For make the conformability for the customer, new machine satays have make it and produce. To make sure this ability from comfortable and safe, these machines have development and modified from satay machine now at the market from observer and experiment. This machine, have the skewering concept where it is kill time the burn process to burn the satay and not have to rotated the satay but have the rotated the skewer table machine. And, it is having to lock to lock the moving the rotation skewer table machine. This machine can to carry anywhere for the picnic or like another place. These projects have successfully although it is difficult to carry but that still have can to carry.

ABSTRAK

Melihat masalah mesin pembakar sate sekarang belum lagi wujud mesin sate yang menggunakan konsep putaran yang boleh dibawa. Produk sekarang yang mempunyai konsep yang sama hanya mempunyai mesin yang besar, tidak boleh dibawa dan boleh menghasilkan kuantiti yang banyak untuk menghasilkan sate. Konsep putaran ini memudahkan pengguna membalikkan sate dan tidak terdedah tangan kepada kepanasan api dan mempercepatkan proses pembakaran sate. Untuk menghasilkan keselesaan kepada pengguna, sebuah mesin pembakar sate telah direka dan dihasilkan. Untuk memastikan penggunaannya yang selesa dan selamat, mesin ini diubahsuai daripada mesin pembakar sate yang sedia ada di pasaran sekarang hasil penelitian dan kajian. Mesin ini mempunyai konsep putaran dimana ia mempercepatkan proses pembakaran dan tidak perlu dibolak-balikkan. Ianya juga mempunyai pengunci, untuk mengunci pergerakan putaran tersebut. Mesin ini boleh dibawa kemana-mana untuk berkelah atau sebagainya. Projek ini mencapai objektif walaupun ianya sukar dibawa tetapi ianya masih boleh dibawa.

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CHAPTER 1

INTRODUCTION

1.1 PROJECT SYNOPSIS

The purpose of the project is to development design of a mini satay skewering machine. This machine would be different from another machine. In this study, the mini skewering machine will be design and fabricated and ensure this machine comply with customer needs. As a Diploma final year project allocates the duration of 1 semester, this project is need skills to handle several machine such as turret punch machine, bending machine, shearing machine, welding machine, drilling machine and grinding machine.

Title this project is "Development Design of a Mini Satay Skewering Machine". This project involves the fabrication of mini machine with a specifification regarding strength, material and cost. Overall, this project will be acquire the skills of design and fabrication. In this project, the machine can might easy to carry and use Solid Works design software.

1.2 PROBLEM STATEMENT

The problems are common faces by customer who want barbecue at the special place, like beach, jungle and others. Firstly is barbecue machine hard to carry. Other that, satay machine not have rotated system yet where this is kill time to cook. This machine know at the market have much material to assembly. And lastly, mini satay now not have system skewering machine yet.

1.3 PROJECT OBJECTIVE

The main objectives of this project are:

- i. To develop an easy carry satay skewering machine
- ii. To develop new design and fabricate mini satay skewering machine because before this, mini skewering design not have yet in market.

1.4 PROJECT SCOPE OF WORK

Scopes of the projects are limited to the equipment and materials. Firstly, the product must use the skewering machine method. After that, modified skewering machine to easy rotated. The design of product is assisted by using solid works software. Fourthly, fabrication process will use all necessary manufacturing process including punching, bending, threding, cutting and joining are welding and. And lastly, material selection come from stainless steel and steel

1.5 PLANNING PROJECT

According to the gantt chart from Table 1.1, project briefing started followed by briefing final year project. These include know how to write the report and final year project procedures. The planning process at week 1.

After that, this project was continued with got the tittle final year project with supervisors at week 2. Then, continued with gathering objectives project from supervisor at week 2. Then, continued with collecting literature review at week 2 to week 5. These include gathering raw data via internet, book and other source.

Then, design begin at week 3 to 8. This is started with sketching 6 types of mini skewering machine and then identify the best from analysis. Next, design the mini skewering machine and then identify the best product from analysis with matrix chart. Next, design the mini skewering machine that was chosen, using solidwork software with actual dimension.

Material to be used must be suitable and easy to get. The specification when choosing a material includes strength, durability, corrosion resistance, light and thermal heat. This is important to fabrication process. Before that, static analysis will be found to gathering information from material use and force at table skewer.

After that, mid semester presentation at week 7 for know the progress report of the project. Evaluation stage has been implemented after fabrication stage. The evaluation is to consider the strength, safety, workability of the table. During the evaluation, if problem occur such as malfunction, modification will be done. And project can will be done.

Next task is the final report writing and final presentation preparation. The report is guided by UMP Thesis writing guided and also guidance from my supervisor.

Project Activities	Weeks														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14
Briefing the Final Year Project by Lecturer	Plan														
	Actual														
Got the Title for Final Year Project from Supervisor	Plan														
	Actual														
Objective	Plan														
	Actual														
Literature Review	Plan														
	Actual														
Design with Sketching	Plan														
	Actual														
Matrix Chart	Plan														
	Actual														
Design with Solid Works	Plan														
	Actual														
Preparation of Material	Plan														
	Actual														
Mid Semester Presentation	Plan														
	Actual														
Static Analysis	Plan														
	Actual														
Fabricate Process	Plan														
	Actual														
Report writing	Plan														
	Actual														
Presentation Final Year Project	Plan														
	Actual														

Table 1.1: Gantt Chart

CHAPTER 2

LITERATURE REVIEW

2.1 INTRODUCTION

This chapter is present about literature review of satay and satay machine such as origin, description and the other else.

2.2 SATAY

Satay (spelt sate in Malaysia) is made of cubed meat, skewered kebab-fashion, then grilled and eaten with a peanut sauce dip. Tracing its origins to the Arabs, the satay has adapted to the multi-cultural palates of Asians with various spicy sauces and different ways of marinating the meats.

2.2.1 Origins

Arabs were known to skewer their meat on swords before roasting and Middle Eastern nomads would barbecue their meat on metal skewers known as kebabs or sharwarma. The spice trade which brought Arab traders to Southeast Asia led to the spread of Arab culinary culture to the Indonesians and eventually to Malaysia and Singapore. Similarly, during the Turkish invasion of Cyprus, kebabs or sharwarma were adopted by the locals and is today a popular dish amongst the Greeks and the Cypriots besides the Turks, the Egyptians and the Arabs. The dish spread beyond to Northern India with even Beijing residents savouring fiery flavoured kebabs today. The

uniqueness of satay in Asia is that wooden skewers are used unlike metal in their Arab counterpart.

The satay sauce, made up of ground peanuts and other spices, was first introduced in the Philippines by the Spanish from South America. Used to marinate the pieces of meat, the remaining sauce is used as a dip after the meat of the satay is grilled.

2.2.2 Description

The meats used are beef, mutton, lamb, or chicken, and amongst non-Muslims pork. The small cuts of meat are marinated in various spices which also works to tenderise the meat. They are then skewered through wooden sticks. Satay sticks were originally dried, thin stems of the coconut leaf but today, factory-generated bamboo sticks are used. The satay is barbecued over a flaming charcoal fire, whilst constantly brushed with oil for a tantalising glaze, until well-browned. The stick of grilled meat is then served with a bowl of peanut dip and cuts of cucumber and onions. The small cuts of meat means up to 20 sticks can be eaten in one go and is often served as a complete meal accompanied with *ketupat* or steamed rice wrapped in woven leave packets.

2.3 BARBECUE MACHINE

2.3.1 Electric Barbecue Grill



Figure 2.1: Type of electric barbecue grill machine.

Product Description

1. Voltage/Power:230V~ 50Hz/2000W
2. Unit Size:560X370X100mm
3. Adjustable thermostat
4. Indicator light
5. Adjustable to 3 different height to grill
6. Micro-switch for safty lock
7. Portable for indoor and out door use
8. Easy to clean

2.3.2 Four-head Environmental Roaster (gas0)



Figure 2.2: Type of four head environmental roaster.

Product Description

Type: ET-K22 (Luxury), ET-K222 (Standard)

Size : 580x400x180mm ;

Configuration : Stainless steel shell ,quartz glass cover, sprayed shell,standard cover

- ETON most newly design product.
- Elegant shape.
- Wide application,hygiene,safe and easy to operate.

2.3.3 Gas BBQ



Figure 2.3: Gas bbq machine.

Product Description

Model No. : B401SR

Product size: 1650 X 620 X 1230 mm

Carton Size: 920 X 690 X 585 mm 880 X 590 X 700mm

Construction:

1. Stainless steel hood with chrome steel handle
2. Stainless steel cart doors with side burner on right side and control panel with electronic ignition
3. Built-in insulated ice bucket with stainless steel lid
4. Stainless steel storage drawer
5. Slide out propane tank drawer
6. Deluxe removable grease tray
7. 4 cast iron bar burners; 12,000 BTUs each; 48,000 BTUs total
8. 10,000 BTU cast iron side burner with brass insert
9. 10,000 BTU rotisserie burner and rotisserie set
10. Plating wire warming rack
11. Cooking surface: 810x500mm
12. 4 heavy-duty steel casters

2.3.4 Sell Barbecue Grill



Figure 2.4: Sell barbecue machine.

Product Description

- 1) Elegant appearance design; with desk top and stand feature;
- 2) Precise temperature control;
- 3) Firm grill for stuff placing;
- 4) Compact package for economic freight;
- 5) Flexible dismiuntability provides cleaning convenience;
- 6) Adjustable grill height creates temperature selection for different stuff to be roasted.

2.3.5 Barbecur Machine



Figure 2.5: Barbecur machine.

Product Description

We use health as premise and environmental idea as concept. We specially develop infrared ray automatic turning skewer with less oily smoke, less scorched and without pollution. This machine is good product in field of barbecue and sharp weapon for starting an undertaking and becoming rich. It is also your only and the best choice. Their features detailed as below:

1. Do not need personal care and save the expenses of labor force.
2. The skewing food is not easy to scorch, so it can keep the best flavor, will not lose the nutrition and cannot cause the cancer.
3. Make use of theory of infrared ray to have well-distributed heat, fully burned, less oily smoke.
4. Save the source of power.
5. The roller grill is fixed to this unit for barbecue of all kinds of food, fish, meat, etc.
6. The device comes in various sizes, or by use of infrared or carbon to bake or electric quartz heater to select your specific demand.

2.3.6 Barbecue Grill Netting



Figure 2.6: Barbecue grill netting.

Product Description

Process barbecue grills wire netting according to customers specific requirements. Barbecue grill wire netting is mainly used in camping, tenting, military, travel etc. Barbecue grill wire netting is based on crimped wire mesh, surface treatment with zinc coated or chromium plated. Barbecue grill wire netting enjoys bright color and good structure.

Detail description as follows:

Material: Crimped iron wire netting

Finish: Zinc coated or chromium plated

Characteristics: Bright color, good structure, export standard .

2.3.7 Portable Barbecue



Figure 2.7: Portable barbecue machine.

Spectation: 26 x 26 x 13.2 cm

Net.Weight: 990g

Burns: Charcoal

Suitable: Outdoors / In room

The oven body is the double-decked design, the oven structure succinct is easy to cleaning, Provides 1.5 V cell battery blower,can fast carries on bakes; Free dismantable grill handle; the adjust air inlet, facilitates to adjust firepower.

Includes: one oven body/one handle/two grill pans/two grill trays/one blower/carrying bag

CHAPTER 3

METHODOLOGY

3.1 PROJECT FLOW DIAGRAM

In fabrication of the mine skewering machine, there is a planning of the overall progress to assure the project can be on a schedule.

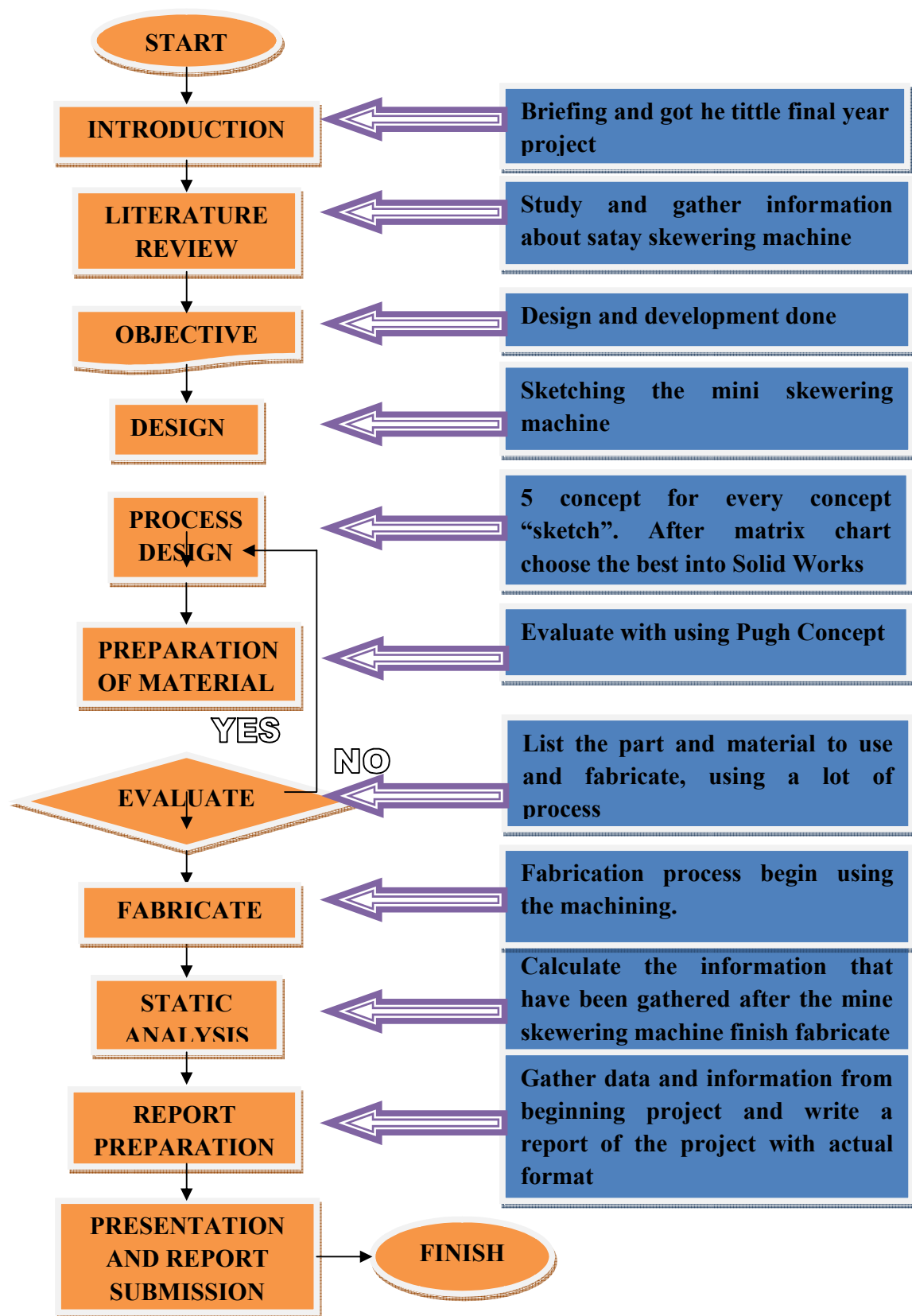


Figure 3.1: Project Flow Chart

From the flow chart above, this project started with introduction while briefing the final year project and got the title for final year project. Then, find the literature review and then study and make a lot of investigation about mini satay skewering machine. This include a study about concept of mini satay skewering machine, process to fabricate and material. These task have been done through study on the internet, books and other sources.

Then the information gathered and the project is continued with the objective this project. It is important to know how to make the project and to design and development done. After that, project is continued with the design process. After several design sketched, design consideration have been chosen by using Pugh concept selection method. The selected sketch is then transferred to detail drawing by using Solid Works software.

After all the engineering drawing finished, the drawing has been used as a reference for the next process, which is list part material use and fabrication stage. This process will consist fabrication to all parts that have been designed by follow the dimension using various type of manufacturing process. The manufacturing process include in this process are welding, cutting, drilling, bending and others.

After fabrication has been finished, static analysis begin. Using calculation the information that have been gathered after the mine skewering machine finish fabricate.

Then, after all the processes mentioned above is done, all materials for report writing are gathered. The report writing process will be guided by the UMP final year project report writing. Preparation for final presentation is also being made by finished the slide show. The project ended after the presentation and submission of report.

3.2 DESIGN

3.2.1 Introduction

The design of the mini satay skewering machine must be compliance to several aspects. The design consideration must be done carefully, so the design can be fabricated and the mini satay skewerig machine be functioning. The aspect that must be considered in designing the mini skewering machine are:

- Durability : The table satay must be durable when rotation begin.
- Material : The material that will be high thermal conductivity and corrosion resistance
- Cost : It depends on material and manufacturing process should reduce the cost to the minimum.

3.3 CONCEPT SELECTION METHOD

The design of mini satay skewering machine must through process of concept selection method. It includes sketching five types of mini satay skewering machine that have certain characteristic and advantages. The sketches design of mini satay skewering machine are:

3.3.1 Concept A

There are several advantages at concept A. It has a lock key, heavy, stabilize, rotational system and easy to finish this product.

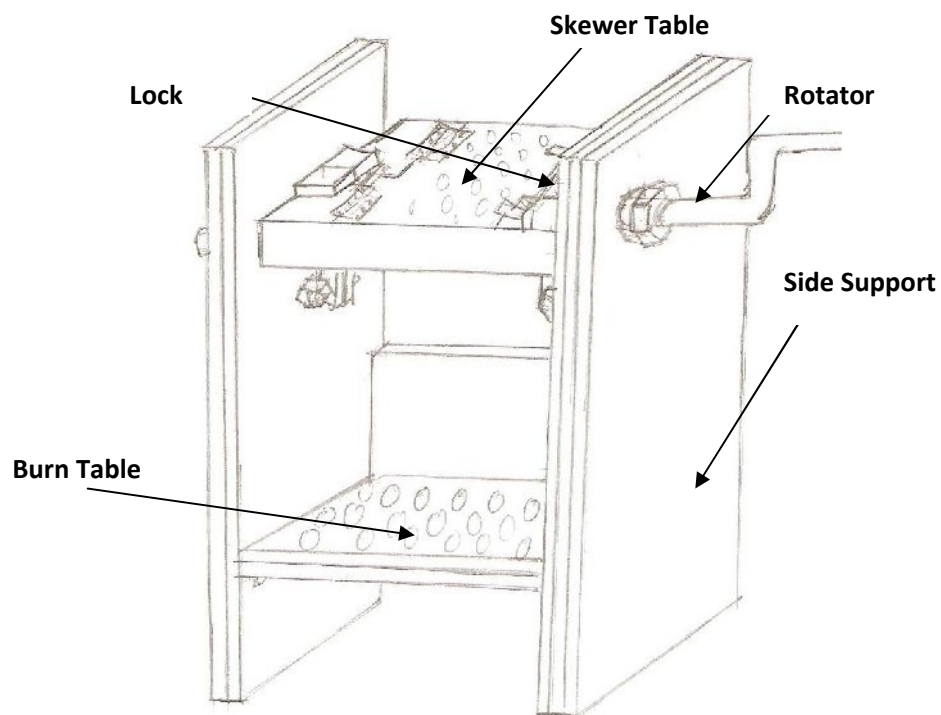


Figure 3.2: Show a concept of stabilize

3.3.2 Concept B

There are several advantages at concept B. It has a net wire, sliding moving, rotation system and open burning place..

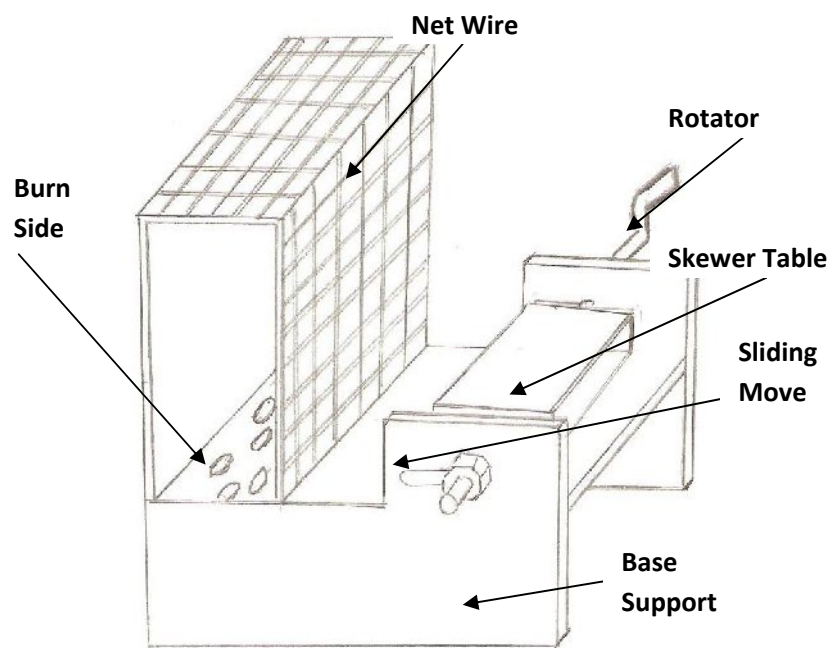


Figure 3.3: Show a concept of sliding moving

3.3.3 Concept C

There are several advantages at concept C. It is simple product then have three table side, net wire, rotational system and roof.

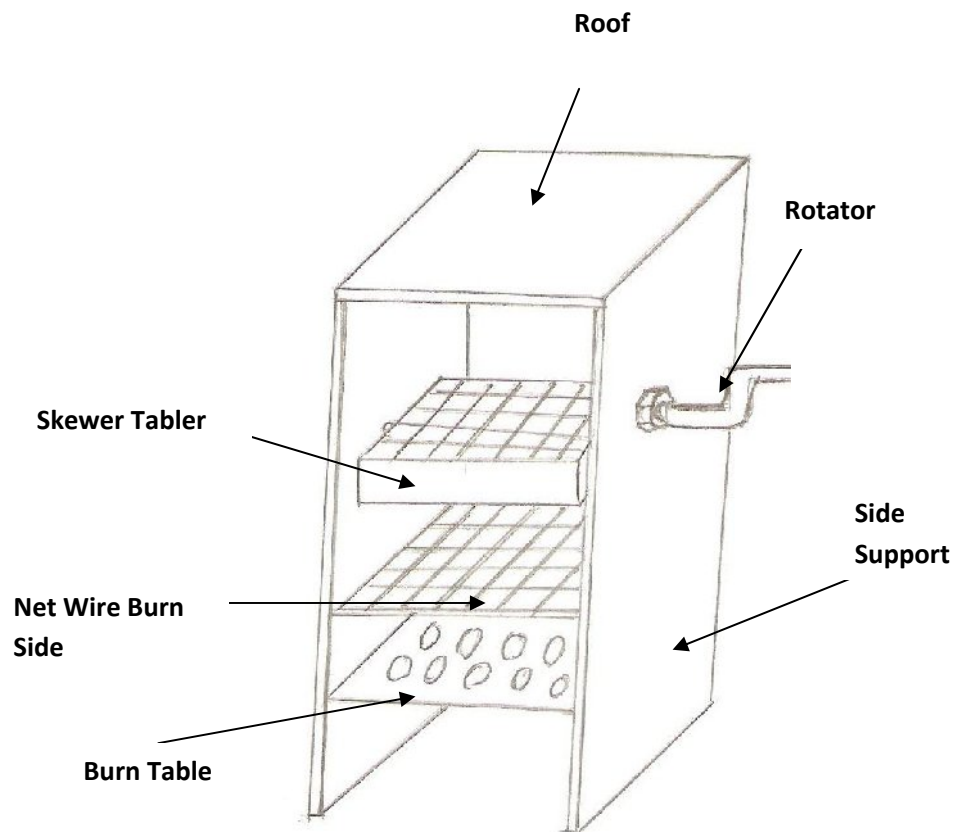


Figure 3.4: Show a concept of three layer.

3.3.4 Concept D

There are several advantages at concept D. It is simple product then have three table side, not roof, have rotational system and open side.

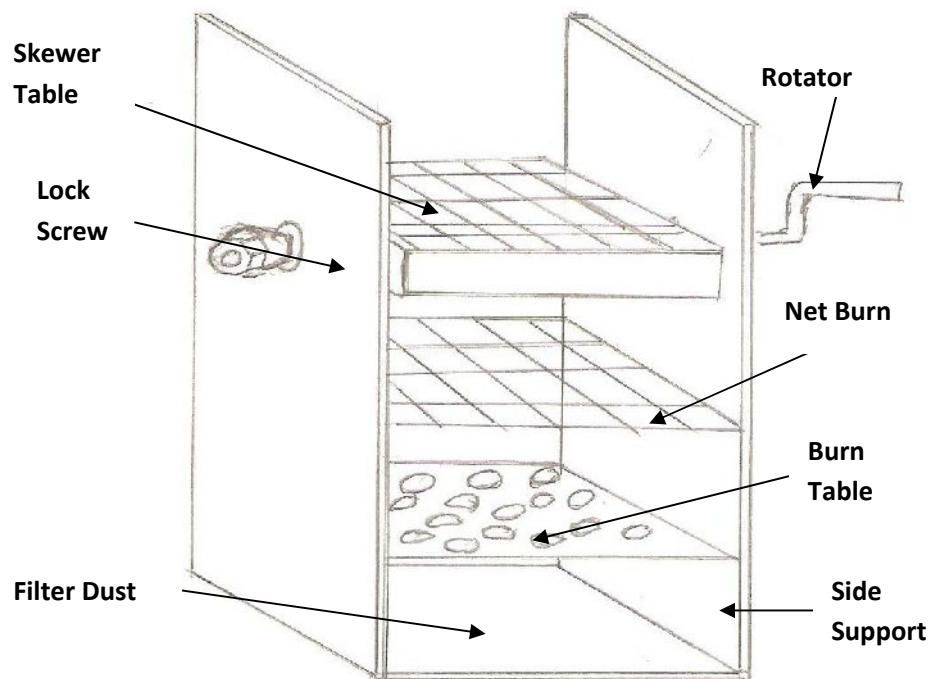


Figure 3.5: Show a concept of open side.

3.3.5 Concept E

There are several advantages at concept E. It is simple product then have three table side, not roof, have rotational system, high support basement and open side.

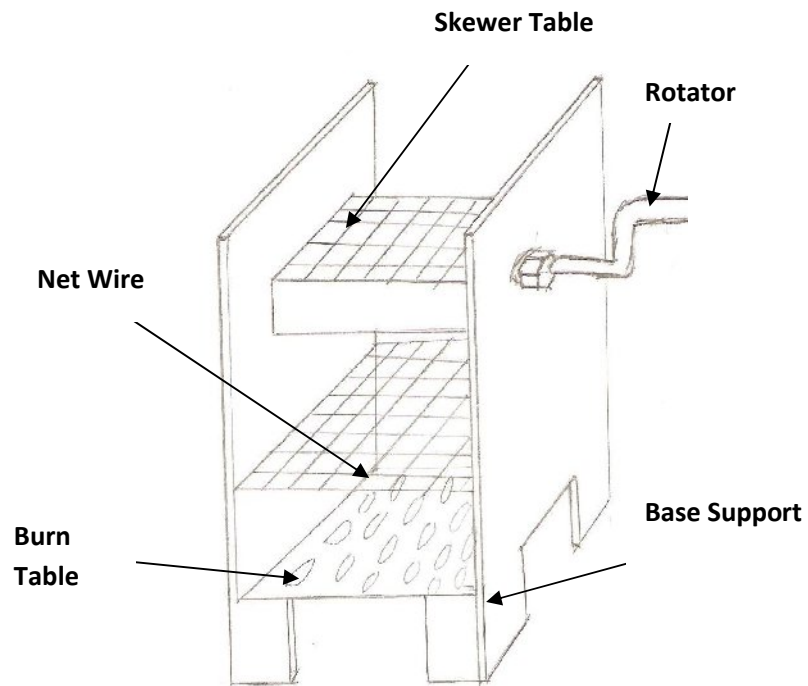


Figure 3.6: Show a concept of high support basement.

3.3.6 Concept F

There are several advantages at concept F. It is simple product then have two layer side, have system skewering, open-closed roof for killtime to process burning, front cover to protect heat.

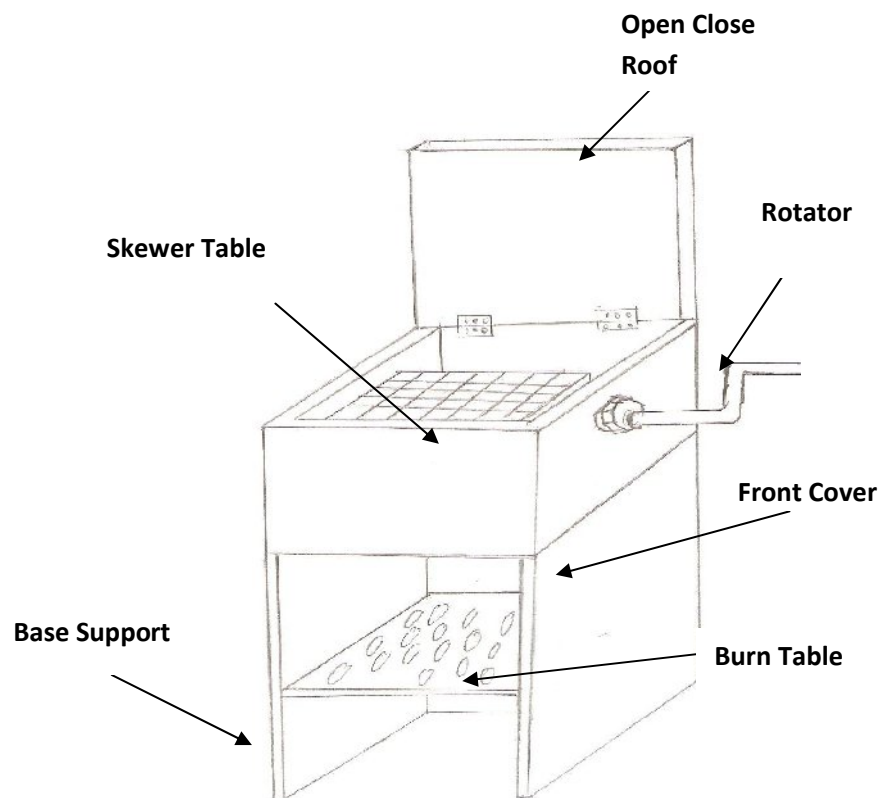


Figure 3.7: Show a concept of skewering machine function.

3.3.7 Concept Generation and Evaluation

This is table to determine the best concept for fabricate mini skewering machine.

Table 3.1: Matrix Chart selection method

Criteria		Concept A	Concept B	Concept C	Concept D	Concept E	Concept F	Best Concept
Light weight		*	****	*****	*****	*****	*****	B,C,D,E,F
Good looking		**	*****	*****	*****	***	*****	B,C,D,F
Easy to manufacture		***	*****	**	****	*****	*****	B,D,E,F
Easy to handling		***	*****	*****	*****	*****	*****	B,D,E,F
Easy to use		**	*****	*****	****	*****	*****	B,C,D,E,F
Material usage		*	****	*****	*****	***	*****	B,C,D,F
Material cost		**	*****	***	*****	*****	*****	B,D,F
Protection		*	**	***	*	*	*****	F
Strength		*****	****	***	***	**	***	A
Easy to carry		**	*****	****	*****	*****	*****	B,C,D,E,F
* very bad		CONCEPT	A	B	C	D	E	F
** bad		TOTAL						
*** medium		BEST	1	7	5	6	5	9
**** good		CONCEPT						
***** very good		SELECT	X	X	X	X	X	√